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LANGUAGE LABORATORY STANDARDS AND SPECIFICATIONS.

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INDIANA'S DEPARTMENT OF PUBLIC INSTRUCTION HAS PREPARED A MANUAL OF GUIDELINES FOR SELECTING LANGUAGE LABORATORY EQUIPMENT TO BE USED IN INDIANA SCHOOLS. THE MANUAL CONTAINS CONTRACT SPECIFICATIONS COVERING GENERAL INFORMATION AND PROVISIONS, THE EQUIPMENT FOR THE PROGRAM PREPARATION ROOM AND THE LABORATORY CONSOLE ROOM, AND EQUIPMENT, FURNITURE, AND SUPPLIES FOR THE STUDENT POSITIONS. ILLUSTRATIONS AND DETAILED DESCRIPTIONS OF THE FUNCTIONS INVOLVED FOR EACH SECTION ARE INCLUDED. A 6-PAGE BID FORM AND A GLOSSARY COMPLETE THE MANUAL. (GJ)

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STATE OF INDIANA
DEPARTMENT OF PUBLIC INSTRUCTION

# LANGUAGE LABORATORY STANDARDS AND SPECIFICATIONS

FL 000 330

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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1964

# DIVISION OF SCIENCE, MATHEMATICS AND MODERN FOREIGN LANGUAGE, TITLE III, N.D.E.A.

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# FOREWORD

In recent years the learning of foreign languages has increased in quantity as well as in quality. This renewed emphasis has been due mostly to our broader relationship between foreign languages and our concern with international relations.

Government, industry, business, interest in foreign travel and cultural exchange have all contributed to a new awareness that the ability to communicate with peoples of other lands is of paramount importance. The approach to foreign language instruction has, thus, moved away from the traditional grammar-translation technique to an emphasis on learning to speak the foreign language.

Recent developments in the field of educational technology have aided language teachers by making available the use of electro-mechanical equipment. Such equipment can be of great help to the teacher who stresses the audio-lingual skills. Effective use will not be realized if traditional textbooks are used as source material.

Much time should be devoted by the school system considering the installation of a language laboratory for, as we mentioned, the utilization and effectiveness of the laboratory is tied into curricula objectives. It is suggested that schools consult the Curriculum Guides for French, German, Russian or Spanish published by the Indiana State Department of Public Instruction (1963). In addition, consultant service may be requested from the Department.

This guide is designed as a sample procurement for language laboratory facilities. It is not mandatory, however, it is felt that it can serve as a guide to school administrators and teachers who are considering the installation of such equipment.

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# STATE SPECIFICATIONS

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# STATE OF INDIANA
# LANGUAGE LABORATORY STANDARDS AND SPECIFICATIONS
## SECTION 0: INTRODUCTION

0.1 It is the purpose of these specifications to define functions and to set forth standards of quality for language laboratory equipment purchased for use in the public schools of the State of Indiana. The use of these specifications is not mandatory; however, they can serve as a guide for the procurement of language laboratory facilities.

0.2 The laboratory system specified is capable of broadcasting several taped lesson programs simultaneously to different groups of student positions. A phonograph record, a sound film, or radio can also be used to provide a lesson program. Each student position consists of a semi-isolating booth, a pair of earphones, a microphone, and a dual-channel tape record-playback machine. Each student is able to hear the master lesson program channeled to him from the console by the teacher (LISTEN function). When the student responds to the program, he hears his own voice simultaneously through his earphones (LISTEN-RESPOND function). Further, the student can at any time record both the master program and his own voice on the booth tape recorder, later playing back the recording for comparison (LISTEN-RESPOND-COMPARE function). Finally, the student can record the master program coming from the console onto the master track of the booth recorder (or he can check out a pre-recorded lesson tape for his own individual use), enabling him thereafter to control his own "master" tape, studying at his own learning rate, recording and re-recording his responses on the student track without erasing or altering the master track. These functions comprise DUAL CHANNEL operation.

0.3 The teacher's console contains, in addition to the program sources, an intercom panel by means of which the teacher can listen to and/or talk with any student individually; also, all the students can be addressed simultaneously, either through their earphones or through a loud speaker system. Provision is made either at the console or at a separate location for the preparation of the master programs (lesson tapes), whether they are recorded by the teacher or copied from another tape or phono record.

0.4 In addition to the conventional system just described, several types of specialized laboratory systems (i.e. portable and remote control) are in use in Indiana schools. Such systems may be considered if it is felt that they may better meet the objectives and requirements of a particular school. However, if such a system is considered, it should also meet the standards of electronic and mechanical quality suggested herein.

0.5 Before purchasing any language laboratory system it is recommended that the school obtain the services of a qualified consultant, who has no commercial involvements, to help with the defining of teacher objectives and the planning of the laboratory system. You may contact your State Foreign Language Supervisor, Department of Public Instruction, 227 State House, Indianapolis 4, Indiana for assistance.

0.6 The specifications are worded in such a way that they may be copied verbatim by school corporations desiring to specify such equipment. Blanks have been provided for the entering of information pertinent to a particular school; for example, when the following sentence appears, "_____ microphones shall be provided, one for each student position," the appropriate number should be entered in the blank. Also, certain equipment options can be specified by selecting the appropriate paragraphs and omitting others. The following are options which can be specified in this way:

(1) The option of purchasing listen-respond equipment only instead of listen-respond-compare equipment for each position. This option cuts the total cost by one-third or more; however, it sacrifices advantages of the student compare feature along with those of enabling the student to work individually with his own lesson tape. Many schools compromise by purchasing a majority of listen-respond positions supplemented by at least 20% listen-respond-compare positions in the back rows for testing, remedial, and enrichment purposes;

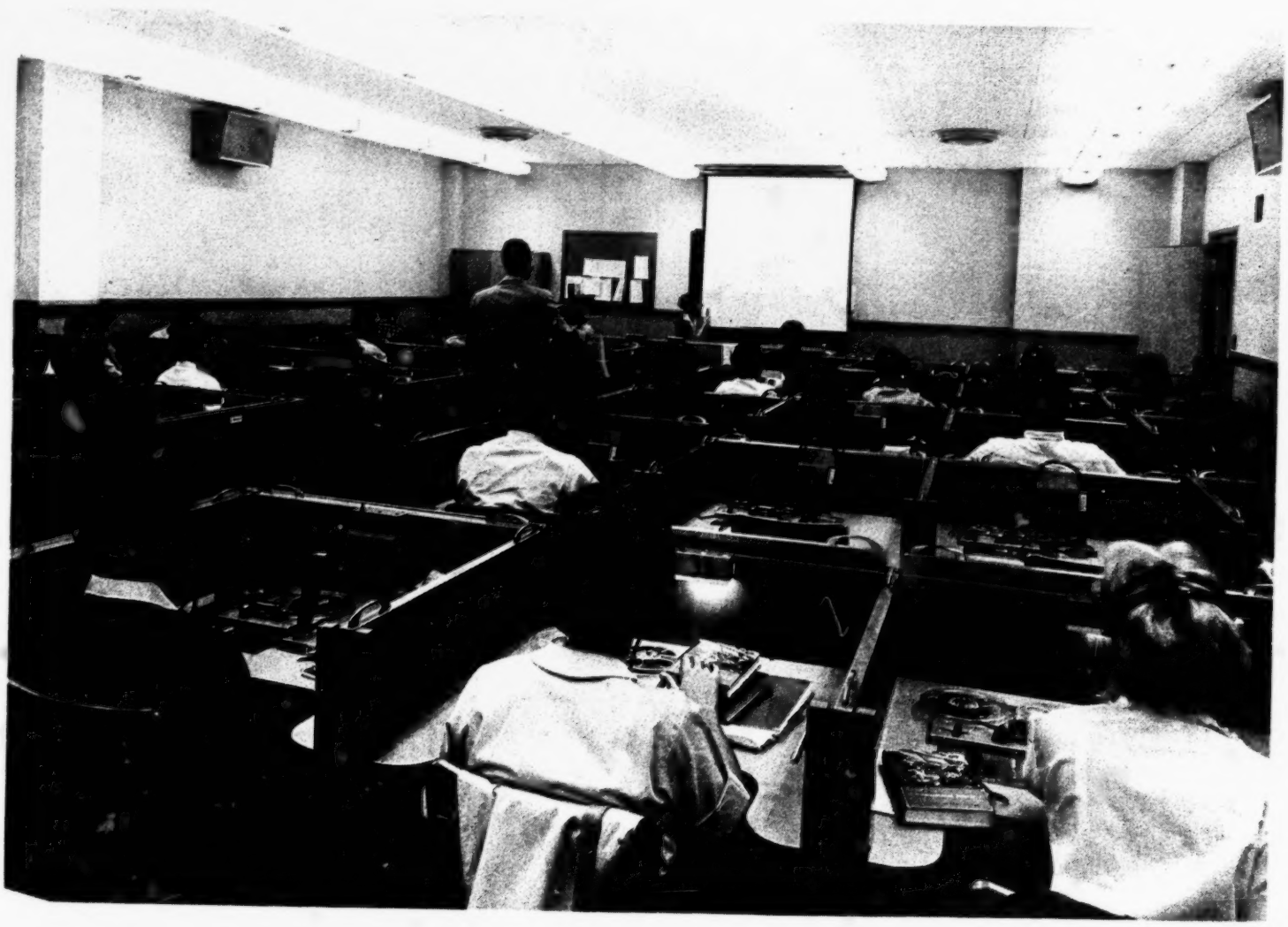
(2) The option of purchasing program preparation equipment combined with console equipment rather than separated in a program preparation room. This option also saves some money, but does so at the expense of flexibility of utilization, convenience to teachers and quality in recorded programs. A separate preparation area can be used at the same time the lab is being used, during normal school hours; and its built-in recording studio assures better recording quality.

0.7 In each case that an option is available, an explanatory sentence in brackets [ ] will appear with the optional section of the specifications. In a few cases, one or two sentences of a section itself may be optional, in which case those sentences will also appear in brackets.

0.8 The choice of room location for the laboratory should depend upon the following considerations: The room should be relative isolated from outside sources of noise -- not adjacent to shop areas, music room, or busy streets. Thought must be given as well to the acoustic treatment of the room itself. The room should at least have an acoustical ceiling.

0.9 Approximately 12.5 square feet of floor space is needed for each student position; and space must be provided for aisles, for the console, for storage of tapes and other materials, for projection equipment, and for the distance between the first row and the projection screen (usually about the amount of space required for one additional row). The arrangement of booths and console within the room must take into consideration the location of the projector and the visual sight lines of each student to the screen,

0.10 The projection screen itself should be chosen in accordance with the size of the room, the viewing angles required, the focal length and brilliance of the projector, and the amount of light control in the room (Darkening shades or drapes are recommended to improve the latter). Manufacturers' projection charts are helpful and should be consulted. A matte screen, 60" x 60", equipped with a spring roller, dust cover, and permanent wall or ceiling mountings is suggested as a minimum standard. Projectors, both motion picture and slide-filmstrip, should be chosen with a focal length and aperture to agree with the size and layout of the room and should be capable of accommodating lamps of 750 watts or more. For the sound motion picture projector, a patch cord must be provided to connect the projector's amplifier to the laboratory sound system.



0.11 If fluorescent lighting is used, care must be taken to insure that it does not interfere with the performance of the laboratory's electronic equipment.

0.12 Electrical power to the laboratory room should include a 15 ampere circuit for each ten booths in addition to a separate 15 ampere circuit for the projection equipment and a 20 ampere circuit for the console. The program preparation room should be supplied with two 20 ampere circuits. Finally, the location of the laboratory should be considered in view of its proximity to the foreign language classrooms, the repair room and other related areas, including those that might be incorporated into the laboratory in case of future expansion.

0.13 After a language system has been purchased and installed, and before final payment has been made to the contractor, the laboratory should be tested and checked out thoroughly to ascertain whether the specifications have been met. Spot checking of a few student positions is inadequate. Each and every component should be tested individually for function and sound quality and then the entire laboratory should be checked as a system with all equipment turned on and operating.

CONTRACT SPECIFICATIONS

FOR

_____ HIGH SCHOOL

The contractor shall supply a complete language laboratory system as described in this specification and install it in room(s) _____ of _____ school.

GENERAL PROVISIONS: STANDARDS AND CODES . . . . . .

SECTION I: GENERAL PROVISIONS

1.1 BID FORM: Bids must be made on the BID FORM provided (section X). All items on the BID FORM shall be completed by the bidder. The owner may reject any proposal not made on this form, or made on this form but not complete.

1.2 LIST OF MANUFACTURERS: The contractor shall indicate on the BID FORM the actual manufacturer of all equipment and principal components which he proposes to use to fulfill the specifications of this contract.

1.3 LIST OF SUBCONTRACTORS: Bidder shall furnish on the BID FORM the names of any subcontractors (Section X).

1.4 PRESENT LABORATORY INSTALLATIONS: Bidder shall furnish on the BID FORM a list (Section X.3) of laboratories installed in Indiana by his firm within the 18 months prior to the date of the opening of this bid.

1.5 DAMAGE TO BUILDINGS: The contractor shall be completely responsible for any damage caused to the building or its contents as a direct or indirect result of the execution of this contract.

1.6 DEFECTIVE WORK AND MATERIALS: Workmanship found to be defective, improperly placed, or not in strict conformity with the specifications, shall be removed and satisfactory materials or workmanship substituted therefor without delay, and without expense to owner.

1.7 PERFORMANCE BOND: The contractor shall be required to post a performance bond in an amount equal to the total contract price with a recognized corporate surety, the bond to be presented to the owner and approved by the owner. The bond is to be in effect until the owner accepts the completed laboratory.

1.8 CLEANING UP: Upon completion of the work, the contractor shall carefully clean up all debris, carton, etc., remaining from his work and remove same from the premises.

1.9 QUALITY: Where one or more specific materials, trade names, or articles of certain manufacturers are mentioned, it is done to establish a basis of durability, efficiency, appearance, and simplification of maintenance, and not for the purpose of limiting competition. Other materials or articles may be used if approved by Owner. However, the establishment of proof that said "equal" product is equal to the product specified, shall be the responsibility of the Bidder, if said equality is quentioned by the Owner. Should it be determined that the substituted product is not equal to the product specified, the Owner shall have the right to choose either the product speci-

fied, or one of equal quality at no extra cost to the Owner.

1.10 ELECTRIC CURRENT: The owner will supply the contractor, without charge, electric current which may be desired in connection with the installation work.

1.11 PATENTS: The contractor and his sureties shall assume all responsibility for damage to owner arising through infringement of patent rights connected with any or all the materials appliances, articles or systems used in the performance of this work and shall pay all royalties on the apparatus or methods installed by him.

1.12 CHANGES IN THE WORK: The owner shall have the rights to make changes during the progress of the work; such changes, whether they increase or decrease the contract amount, shall be determined by negotiation between the contractor and the owner.

1.13 INSPECTION OF PREMISES: Bidders are invited to visit the high school to inspect the building in which this equipment is to be installed. Failure to do so will in no way relieve the successful bidder of the necessity of furnishing any materials or performing any labor necessary for the satisfactory completion of the work in accordance with the specifications.

1.14 INSPECTION PERMITS: This contractor shall apply for, obtain, and pay for all permits required. All equipment, materials, and workmanship shall be subject to inspection and final approval by a representative of the school.

1.15 MATERIALS AND WORKMANSHIP: The materials used shall be new and of the best quality; and when installed, they shall be left in a condition satisfactory to the owner.

1.16 DRILLING AND CUTTING: All drilling and cutting necessary to make this installation, in keeping with the codes and specifications already quoted, shall be done by the contractor at his own expense. Any damage to existing building materials or finishes shall be replaced or repaired by workmen qualified in corresponding trade to the satisfaction of the owner.

1.17 SCOPE: The work to be performed under this contract shall include the furnishing of all necessary labor, materials, and equipment required to perform the functions as will be hereafter specified.

1.18 SAMPLES: The successful bidder shall submit for approval such sample components or items of equipment as Owner shall deem necessary. Samples shall be shall be submitted prior to award of the contract and prior to finishing of any equipment. Number and size of samples to be designated by the Owner.

1,19 TEACHER TRAINING AND ORIENTATION: The contractor shall agree to sponsor, as soon as the language laboratory is ready for regular student use, a program of instruction by a qualified language laboratory specialist to all teachers and other personnel involved in the functions and operation, maintenance and administration of the laboratory. This program shall include the necessary minimum of group instruction, plus a single check-out of each individual in the function and operation of each item of equipment. Also, as a part of the instructional program, the seller will instruct teachers in such details as proper microphone technique, including the best talking distance for given voice and volume setting. The specialist shall spend at least two separate sessions with foreign language instructors.

1.20 WARRANTY AND MAINTENANCE: All workmanship, materials, and electronic equipment are to be guaranteed to be free from defects and to perform to the level specified for a period of one year from the date the completed laboratory is accepted by the owner.

This contractor shall furnish to the owner complete working shop drawings of the installation together with technical and service manuals and, if any changes are executed during the course of the installation, such changes will be incorporated in the drawings in a manner that will meet with the approval of the owner. All these drawings shall be submitted to the high school for approval before installation has been completed.

1.21 INSTRUCTIONS AND INFORMATION:

a. The contractor shall furnish the owner at least three complete sets of clearly written and illustrated installation, operating, and maintenance instructions including complete wiring diagrams and parts lists, to assure ready access to necessary replacement parts and essential service data as follows:

(1) A parts list for each component, which distinguishes between standard parts -- those readily available from electronics parts dealers -- and parts of proprietary design, available only from the manufacturer.

(2) An accurate schematic diagram of each component to facilitate diagnosis of circuit and component malfunction, component replacement, and circuit and mechanical adjustment.

b. The contractor shall supply with his proposal a wiring diagram of a typical installation, to suggest proper installation techniques, and to indicate the method and materials for interconnection of the various major units.

Upon completion, a detailed wiring diagram of the final installation shall be supplied, to indicate wire location, the location of junctions, connections made at junctions, the type of connectors, wire coding, and any other data considered essential for efficient service.

c. Block diagrams showing functional interconnections of all equipment shall also be furnished.

d. THE LABORATORY SHALL NOT BE ACCEPTED BY THE OWNER, OR FINAL PAYMENT MADE, UNTIL THE TEACHER ORIENTATION HAS BEEN COMPLETED AND ALL ITEMS UNDER a & b ABOVE HAVE BEEN FURNISHED, AND THE LABORATORY HAS BEEN IN ACTUAL USE FOR STUDENT INSTRUCTION FOR ONE MONTH. A GOOD BASIS FOR PAYMENT IS 80% OF THE CONTRACT AMOUNT AT THE TIME OF INSTALLATION, AND THE REMAINING 20% AT THE TIME OF ACCEPTANCE OF THE LABORATORY AS STIPULATED IN PARAGRAPH 1.25 BELOW.

1.22 CONNECTION LABELLING: All interconnecting lines, plugs, connectors and barrier strips must be coded and/or labeled.

1.23 LABELLING: All labels for control racks shall be on laminated plastic engraved with the words, letters, numbers, or symbols indicated in these contract specifications or as may be hereafter determined by the Owner. All such plastic labels shall be fastened by means of small metal screws to enable a quick change or exchange of designation. Tape machines for the rack channels shall be clearly labelled with a numeral not less than 1" high. No adhesive tape, glued, or mastic back labels are acceptable.

1.24 DELIVERY: All equipment shall be delivered and all installation work completed on or before _____(date).

1.25 ACCEPTANCE OF LABORATORY: Upon delivery and installation of all items of equipment and instructions and schematics as required above, and after the laboratory system has been checked out by the Owner or his representatives, written notification of acceptance of the laboratory shall be tendered by the Owner to the Contractor. The date of such notification of acceptance shall constitute the beginning of the one-year warranty period.

## SECTION II: STANDARDS AND CODES

II.1 ELECTRICAL POWER: All materials, equipment, and installation concerned with the power and lighting of the student positions shall conform to the:

a. National Electrical Code of the National Board of Fire Underwriters.
b. National Electric Safety Code.

c. Standards of the National Electrical Manufacturers Association.
d. Standards of the Institute of Electrical and Electronics Engineers.
e. Applicable State and local codes, laws and ordinances.

II.2 ELECTRONICS: All materials, equipment, and installation concerned with the electronic equipment in the student positions, master consoles, and all other equipment pertaining to the functions of the electronic equipment in the student positions shall conform to the standards and requirements of:

a. The American Standards Association.
b. American Engineering and Industrial Standards.
c. Applicable standards of the I.E.E.E.
d. Applicable State and local codes, laws, and ordinances.

II.3 FUSES: All the equipment shall be properly fused in a manner readily accessible.

II.4 POWER: All electronic specifications are based upon an electrical supply voltage of 117 volts, plus or minus 10 per cent, 60 cycles.

II.5 CONDUIT: Conduit shall be of sufficient size and so installed that conductors may be pulled without injury or strain and all bends shall be made with a radius in keeping with the National Electrical Code. Flexible metallic conduit shall be used only where rigid conduit is impractical, and then only by the owner's consent.

II.6 TEMPERATURE RISE: The operating temperature rise of the components within the booths shall be in keeping with the codes and standards already referred to.

II.7 CONDUCTORS: All power carrying conductors shall be type No. 12 AWG with 600 volt insulation.

II.8. GROUNDING: All power carrying devices shall be properly grounded in keeping with the codes and standards stipulated, and no signal carrying circuit shall be grounded to a power carrying conduit or ground.

II.9 MASTER AC POWER SWITCHES: Three master AC power switches shall be provided and installed. One shall control the power to all the student booths in the laboratory room. Another shall control the power for the laboratory room console. The third shall control the power for the program preparation room. Each switch shall have a pilot lamp indicator. Only two switches will be required if there is no program preparation room.

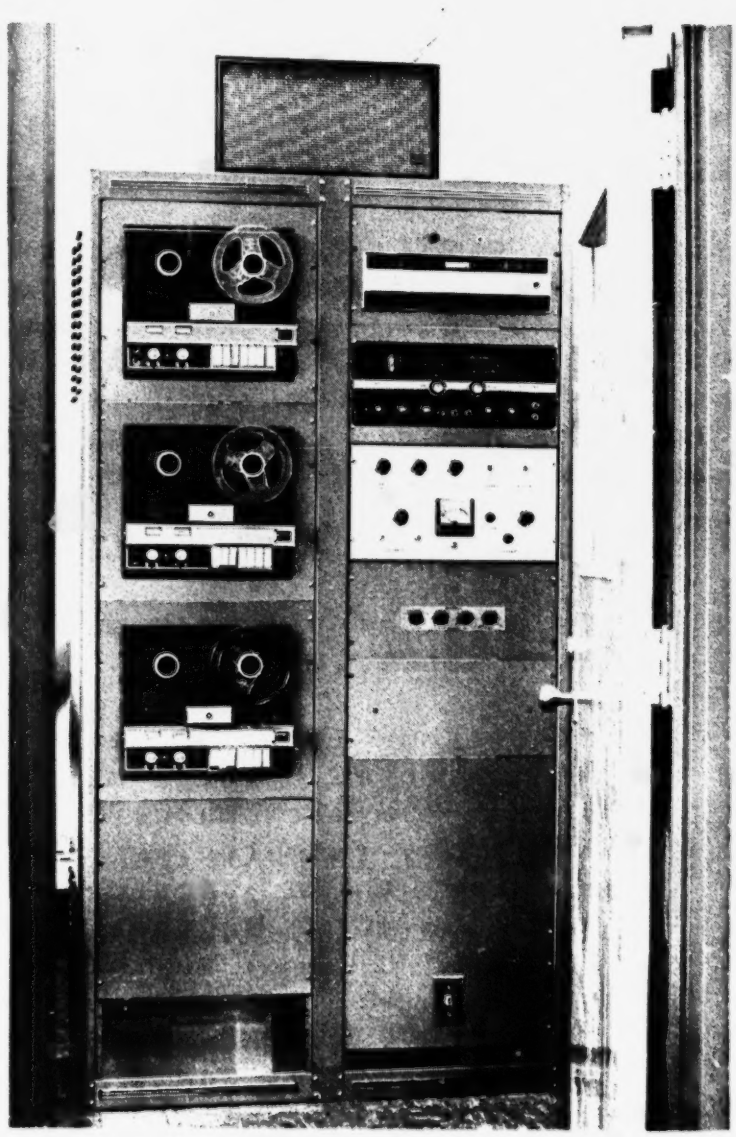
## PROGRAM PREPARATION ROOM AND LABORATORY ROOM CONSOLE

## SECTION III:PROGRAM PREPARATION ROOM

### III.1 DEFINITION:

The program preparation room is a room adjacent to the laboratory and opening into it, or a completely partitioned and acoustically isolated area of the laboratory room itself. The program preparation room shall be equipped to make possible the following important activities which are essential to the operating of any language laboratory:

a. Copying (duplicating) from tape to tape,
b. From phonograph record onto tape, and
c. From short-wave radio and FM-AM tuner onto tape.
d. It shall also be possible to play programs from any of the sources just mentioned over remote lines through the laboratory room console to the student booths in the laboratory room proper, and
e. To make original recordings from microphone onto tape.



III.2 RACKS:

Two telephone relay racks accommodating EIA standard 19" rack panels shall be set up side by side in the program preparation room in the location designated by the owner. The location shall be such that the teacher or technician operating the equipment mounted in them will have a clear view of the laboratory room through a window provided. Each separate item of equipment shall be mounted on its own rack panel, and the rack panels shall be located in the racks according to the attached diagram, or as designated by the owner.

III.3 CHANNELS:

Channels shall be as follows:

Number 1 - Tape record-playback machine
Number 2 - Tape record-playback machine
Number 3 - Tape record-playback machine
Number 4 - Phonograph turntable and amplifier
Number 5 - Short-wave receiver
Number 6 - AM-FM tuner
Number 7 - Auxiliary high-level input
Number(s) 8 and higher - Additional auxiliary, high-level input(s) [optional]

III.4 INSTALLATION:

All audio lines within the rack and remote lines leading from the racks to the laboratory room console shall be properly shielded and grounded, and connections shall be designed so that hum, noise, or cross-talk shall be at least 60 db down. Rack equipment shall include all items named in this section of the contract and all connectors, wiring, switches and other hardware necessary to permit the following functions:

CHANNEL FUNCTIONS:

Channel 1 - Tape record-playback machine with record playback amplifier.

Microphone input to record-playback machine shall be connected through matching microphone transformer and microphone cable to a jack in the recording roomette, or (if no recording room is planned) to an junction box in the program preparation room, so that a low impedance microphone (50 to 150 ohms) may be used for making original recordings. Refer to paragraph 4 below on MICROPHONE RECORDING FACILITIES. High level input to the recorder shall connect to an eleven-position selector switch on the Rack Control Panel. Switch shall be labelled INPUT 1. Selector switch shall permit recording from any other channel onto

channel 1. Output of recorder shall be connected to the selector switch for the MONITOR facility on the control panel, and to the input selector switches of channels 2 and 3 respectively. Output 1 shall also be connected to an eleven-position selector switch on the control panel so that the output may be channeled through the power amplifier and speaker for monitoring in the program preparation room. Output 1 shall further be connected (through a line amplifier if necessary) by remote line (Line A) to position 8 of the laboratory room console program switches so that lessons may be played remotely to the student booths. Output shall be connected to a standard 1/4" phone jacks located conveniently on the rack panel for this machine. Unit must have a record level indicator (VU meter or bar tube). Record-playback machine shall have its own ON-OFF switch with red pilot lamp.

Channel 2 - Tape record-playback machine with record-playback amplifier. All functions the same as channel 1 except that input selector switch shall permit recording from any other channel onto channel 2 and output of 2 shall be connected to position 9 of the laboratory room console program switches.

Channel 3 - Tape record-playback machine with record-playback amplifier. All functions the same as channel 1 except that input selector switch shall permit recording from any other channel onto channel 3 and OUTPUT 3 shall be connected to position 10 of the laboratory room console program switches.

Channel 4 - Phonograph turntable complete with tone arm and equalizer-amplifier. Output of phonograph amplifier shall be connected to a phone jack on the control panel labelled OUTPUT 4. Output shall also be connected to position 4 of the input selector switches for the tape record-playback machines in the racks (numbers 1, 2, and 3). Output shall further be connected to the speaker selector switch on the control panel so that the output may be channeled through the power amplifier and speaker for monitoring on the program preparation room. Phonograph shall have its own ON-OFF switch with red pilot lamp.

Channel 5 - Short-wave receiver

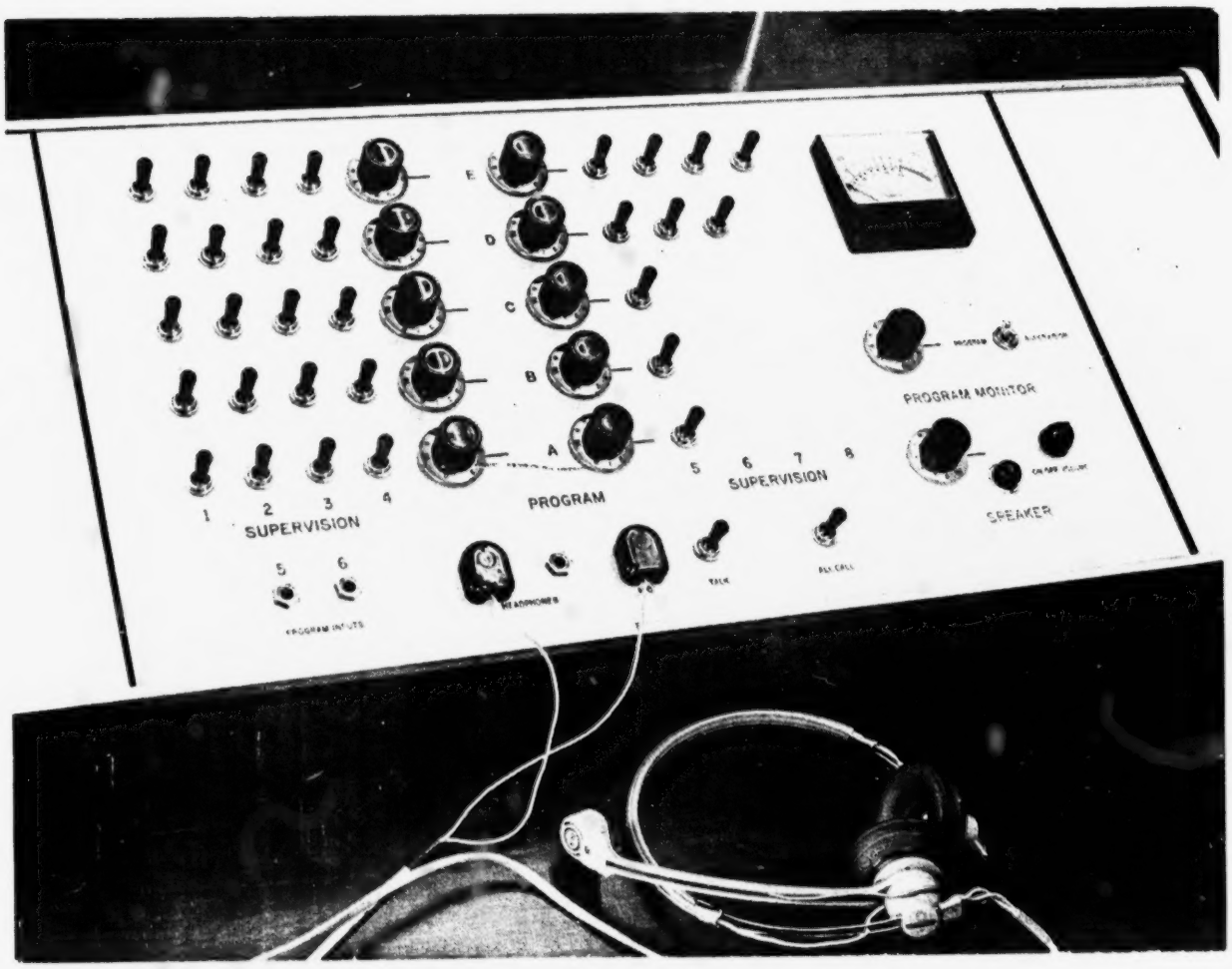
All functions the same as channel 4 except that output shall be connected to position 5 of the input selector switches and to a phone jack on the control panel labelled OUTPUT 5.

Channel 6 - FM tuner

All functions the same as channel 4 except that output shall be connected to position 6 of the input selector switches and to a phone jack on the control panel labelled OUTPUT 6.

Channel 7 - Auxiliary high-level input.

Two phone jacks on the control panel shall be labelled channel 7 INPUT. The jacks shall be wired in parallel so that both channels of a stereophonic source may be fed into the system (which is monophonic), or 2 sources or 2 external sources may be mixed as desired. The two phone jack shall be connected by audio lines to position 7 of the input selector switches for the rack recorders, and to position 7 of the rack MONITOR facility, also to position 7 of the rack monitor speaker selector. In addition the 4th remote line shall be terminated at these jacks so that any program source may be played by remote line through the laboratory room console to the student booths. At the laboratory room console this last remote line shall be terminated at position #7 of the console control program panel switches. Any source connected to the jacks shall perform the same function as channel 4.



[In the event that the school does not elect to purchase radio equipment for channels 5 and 6, these channels shall be Auxiliary high-level inputs the same as Channel 7.]

III.6 CONTROL PANEL:

The control panel shall contain the switches and jacks mentioned in the preceeding paragraphs describing the channels. For clarity, the following is a recap of Control Panel hardware.

III.7 RECORDER INPUT SELECTOR SWITCHES:

Three input selector switches (eleven-position rotary) for channels 1, 2, and 3. Room shall be provided on the panel for the addition of two more selector switches in the future. Two standard 1/4" telephone jacks (wired in parallel) which serve as the input for channel 7 and the fourth remote line (line D).

III.8 MONITOR:

This facility shall include:

a. Two headphone jacks for monitoring at headphone level by at least two persons.
b. One 3-1/2" professional quality VU meter. This meter shall be calibrated the same as the meter on the room console control panel so that the correct program output level may be set for playing from the rack machines to the student booths in the appropriate room.
c. One rotary selector switch, connected so that the outputs of the rack channels may be monitored by meter and headphone.

III.9 MONITOR SPEAKER:

This facility shall make possible the monitoring of programs at loudspeaker level and shall include the power amplifier specified in the BID FORM and the following panel controls:

a. A volume control, and combined with this an on-off switch controlling the power to the amplifier. A red pilot light shall be included to indicate when the amplifier is on.

b. A rotary selector switch which allows any of the 7 rack channels to be selected for playing through the speaker.

c. The loudspeaker system and enclosure as specified in the BID FORM. The speaker shall be mounted on the wall or placed on top of the racks, as shall be hereafter designated by the Owner.

Height of control panel shall be 8-3/4" minimum: This is

necessary for proper spacing of the foregoing switches and jacks, and inclusion of large, legible labelling.

III.10 MICROPHONE RECORDING FACILITIES:

Refer to Channel 1 functions. Three low impedance microphone lines shall be furnished; these shall lead from recording roomette to the tape recorders (channels 1, 2, and 3) in the racks. The lines shall be terminated in a junction box located in a convenient location inside the recording roomette. The box shall contain three jacks clearly labelled with the proper channel number.

The machine onto which the instructor records may then be selected simply by plugging the microphone into the proper jack. If no additional room is available for use as a separate recording room, the microphone lines shall terminate in a conveniently located junction box within the program preparation room, for instructor recording. The location shall be designated by the owner.

III.11 HEADPHONES:

Two sets of professional quality high impedance (45K Ohms or More) headphones shall be furnished for use in the Program Preparation Room.

SECTION IV: LABORATORY ROOM CONSOLE

IV.1 CONSOLE FURNITURE:

The bidder may offer the equipment in console furniture furnished by the manufacturer which he represents provided the furniture meets the following requirements:

a. Console shall be able to contain the named equipment and to perform named functions.

b. Console shall be convenient to use in a manner satisfactory to the owner.

c. Console shall be of such overall height that it will in no way obstruct the teacher's view of all student positions while the teacher is seated behind the console.

d. All tape decks shall be surface mounted, not drawer mounted.

e. Phonograph may be drawer mounted or surface mounted.

f. Console work surface shall be bonded seamless plastic (Formica or equal).

g. Console shall be placed on an eight inch to nine inch

platform to be supplied by _____
[insert owner or contractor.]

h. The contractor shall supply and install, including all cutouts, in the master console the equipment specified in the BID FORM (Section IV page 29), in conformity with the standards and codes heretofore mentioned. - Contractor shall supply specifications and working drawings of console furniture and layout of equipment for approval by owner before installation is made. Mounting and wiring shall be done to fulfill the requirements listed under console functions.

IV.2 LABORATORY ROOM CONSOLE FUNCTIONS:

The laboratory room console shall incorporate a 10-channel system for the distribution of recorded materials and the instructor's voice both through audio cables to the student booths, and through the laboratory speaker systems. It shall provide for instructor supervision of each or all booths by means of a monitor-intercommunication system.

IV.3 CONSOLE CHANNELS:

Channels shall be as follows:

Channel 1 - Tape playback machine
Channel 2 - Tape playback machine
Channel 3 - Tape playback machine
Channel 4 - Phonograph turntable and amplifier
Channel 5 - Projector (external) input
Channel 6 - Auxiliary console input
Channel 7 - Remote line D
Channel 8 - Remote line A
Channel 9 - Remote line B
Channel 10 - Remote line C

INSTALLATION:

Electronic equipment which is to be installed in or mounted on the master console shall be wired and/or interconnected in the proper manner to permit the following functions. All audio lines within the console shall be properly shielded and grounded so that hum or crosstalk shall be at least 60 db down. Console equipment shall comprise the equipment named below in this section of the contract, and all connectors, wiring, switches, meters, and other hardware necessary to permit the following functions:

IV.5 CHANNEL FUNCTIONS:

Channel 1 -- Tape playback machine with playback amplifier. Tape shall play through master distribution panel, line amplifier (if one is utilized), and audio cables to any or all

booths in the laboratory. Channel shall be connected to console monitor selector so that it may be monitored by at least two people simultaneously from the console master distribution panel. Channel shall be connected to a VU meter on the master panel so that the proper output level may be set. Channel shall be connected to the master panel speaker selector so that it may be channeled through the basic power amplifier and speaker systems in the laboratory. Playback amplifier shall have one headphone monitoring outlet. a surface mounted phone jack on machine or console sufface.

Channel 2 -- Tape playback machine with playback amplifier. All functions same as channel 1.

Channel 3 -- Tape playback machine with playback amplifier. All functions same as channel 1.

Channel 4 -- Phonograph turntable with equalizer-preamplifier. All functions same as channel 1.

Channel 5 -- Projector. High level input from the amplifier of a 16mm motion picture projector, external tape recorder, or other high level source. All functions the same as Channel 1. Input jack for this channel shall be located in the rear of the laboratory room in the wall, or in the student booth closest to position of projection equipment when in use.

Channel 6 -- Auxiliary console input (Phone jack). All functions the same as channel 1.

Channel 7 -- Remote line D from program preparation area. All functions the same as channel 1.

Channel 8 -- Remote line A from program preparation area. All functions the same as channel 1.

Channel 9 -- Remote line B from program preparation area. All functions the same as channel 1.

Channel 10 -- Remote line C from program preparation area. All functions the same as channel 1.

CONSOLE PROGRAM DISTRIBUTION:

IV.6 Program from console channels shall be distributed to the laboratory booths by sections. A section is defined as a group of booths in the same row. There should be no less than two nor more than four booths in one section. (See the attached diagrams for examples of typical section arrangements). For this purpose, rotary switches with 11 positions, with positions numbered 1 thru 10 to correspond to the above channels and an OFF position, shall be employed. Accordingly, there shall be _____ rotary switches (one for each section) located on the master panel in a configuration which corresponds to the physical layout of the sections in the laboratory. Room

shall be provided on the panel for the addition of _____ more rotary program switches for _____ section(s) in the future.

IV.7 CONSOLE CHANNEL MONITOR:

Channel Monitor shall consist of a rotary switch with not less than 11 positions, numbered 1 thru 10 to correspond with the channels above, and an OFF position. Output from switch shall connect to at least 2 phono jacks, so that any selected channel may be monitored at the panel by at least two persons.

IV.8 PROGRAM LEVEL CONTROL:

Program level setting shall be accomplished by means of a V.U. meter, 3-1/2 inches in size, mounted conveniently on the master panel. Selection of channel across which meter is placed for reading may be done by incorporating the meter with the console channel monitor above, but a meter ON-OFF switch should be provided to protect the meter from pegging while a high-volume program is being monitored.

IV.9 INSTRUCTOR MONITOR-INTERCOM: The instructor monitor-intercom shall permit the teacher or technician to listen to the recording and/or spoken responses into the microphone of any individual student. It shall also enable the teacher at the console to carry on a conversation with any individual student, without disturbing any other student. Instructor shall be able to talk to any individual student regardless of the position of the student amplifier function control. Instructor shall also be able to monitor the student position in all functions. (This means that in the playback function the instructor is monitoring the student's tape but not his microphone). Monitor-intercom switches shall be placed on the master panel along side the program distribution switches. Switches for accomplishing these functions may be of the toggle or lever type. There shall be switches, one for each student booth. Monitor-intercom shall include a microphone as specified below, and a microphone amplifier with a volume control and ON-OFF switch with pilot lamp. Switching the instructor's microphone on and off shall be accomplished by means of a single switch located conveniently on the control panel, or by means of a press-to-talk microphone. Spring-loaded ALL CALL switch shall be provided. Monitor-Intercom facility shall include two (2) phono jacks. The system shall be designed so that switching of program or monitor-intercom switches does not cause any perceptible change in listening level, or any audible clicks, at the headphones in any of the student booths. Room shall be provided on the panel for addition of monitor-intercom switches for _____ student booths in the future.

IV.10 SPEAKER SELECTOR:

A speaker selector shall be provided to control the switching

of any program from any console channel through the basic power amplifier to the laboratory loudspeaker system(s). The selector facility shall include: 1) an AC ON-OFF switch with pilot lamp to turn the power amplifier on and off, 2) a volume control knob (may be combined with 1) for setting the program level for the speaker system(s), and 3) a rotary channel selector knob numbered to correspond with the console channels, with an additional position labelled MIC., so that the instructor's microphone may be channeled through the laboratory speakers for P.A. purposes.

IV.11 CONTROL PANEL LAYOUT & DIMENSIONS: The contractor shall submit his proposed control panel layout to the owner for approval, Panel dimensions shall not exceed 18" in depth (front to rear), and not more than 24" in width (side to side).

IV.12 HEADPHONES AND MICROPHONES:

The contractor shall supply two (2) headsets and two (2) microphones for teachers' use at the console.

## SECTION V: LABORATORY MASTER CONSOLE
Without Separate Program Preparation Room

V.1 CONSOLE FURNITURE:

The bidder may offer the equipment in console furniture furnished by the manufacturer which he represents provided the furniture meets the following requirements:

a. Console shall be able to contain the named equipment and to perform named functions.

b. Console shall be convenient to use in a manner satisfactory to the owner.

c. Console shall be of such overall height that it will in no way obstruct the teacher's view of all student positions while the teacher is seated behind the console.

d. All tape decks shall be surface mounted, not drawer mounted.

e. Phonograph may be drawer mounted or surface mounted.

f. Console work surface shall be bonded seamless plastic (Formica or equal).

g. Console shall be placed on an eight inch to nine inch platform to be supplied by _____ [insert owner or contractor.]

h. The contractor shall supply and install, including all cutouts, in the master console the equipment named in part (3) below, in conformity with the standards and codes heretofore mentioned. Contractor shall supply specifications and working drawings of console furniture and layout of equipment for approval by owner before installation is made. Mounting and wiring shall be done to fulfill the requirements listed under console functions.

V.2 MASTER CONSOLE FUNCTIONS:

The laboratory master console shall incorporate a 10-channel system for the distribution of recorded materials and the instructor's voice both through audio cables to the student booths, and through the laboratory speaker systems. It shall provide for instructor supervision of each or all booths by means of a monitor-intercommunication system. It shall provide for original recording onto tape, and for copying from record onto tape and from tape to tape(s).

V.3 CHANNELS:

Channels shall be as follows:

Channel 1 - Tape record-playback machine
Channel 2 - Tape record-playback machine
Channel 3 - Tape record-playback machine
Channel 4 - Phonograph turntable and amplifier
Channel 5 - Projector (external input)
Channel 6 - Auxiliary console input
Channel 7 - Auxiliary console input
Channel 8 - Auxiliary console input
Channel 9 - Spare
Channel 10 - Spare

V.4 INSTALLATION:

Electronic equipment which is to be installed in or mounted on the master console shall be wired and/or interconnected in the proper manner to permit the following functions. All audio lines within the console shall be properly shielded and grounded so that hum or crosstalk shall be at least 60 db down.

Console equipment shall comprise the equipment specified in the equipment list (Refer to Section X.1, page ) and all connectors, wiring, switches, meters, and other hardware necessary to permit the following functions.

V.5 CHANNEL FUNCTIONS:

Channel 1 - Tape record-playback machine with record-playback amplifier. Tape shall play through master distribution panel, line amplifier (if one is

utilized), and audio cables to any or all booths in the laboratory. Channel shall be connected to console monitor selector so that it may be monitored by at least two people simultaneously from the console master distribution panel. Channel shall be connected to a VU meter on the master panel so that the proper output level may be set. Channel shall be connected to the master panel speaker selector so that it may be channeled through the basic power amplifier and speaker systems in the laboratory. Recording from any other channel (2 thru 8) onto channel 1 machine shall be possible by rotary input selector switch. Record/playback amplifier shall have one microphone input, a surface-mounted phone jack on machine or console surface near the machine. Amplifier shall have one headphone monitoring outlet, a surface-mounted phone jack on machine or console surface.

Channel 2 - Tape record-playback machine with record-playback amplifier. All functions the same as Channel 1, except that input selector switch shall permit recording from all other channels onto Channel 2.

Channel 3 - Tape record-playback machine with record-playback amplifier. All functions the same as Channel 1, except that input selector switch shall permit recording from all other channels onto Channel 3.

Channel 4 - Phonograph turntable with equalizer-amplifier. Phono shall play through master distribution panel, line amplifier, (if one is utilized), and audio cables to any or all booths in the laboratory. Channel shall be connected to console monitor selector so that it may be monitored by at least two people simultaneously from the console master distribution panel. Channel shall be connected to a VU meter on the master panel so the proper output level may be set. Channel shall be connected to the master panel speaker selector so that it may be channeled through the basic power amplifier and speaker systems in the laboratory. Output of the channel shall be connected to the rotary selector switches for copying onto tape on channels 1, 2, and 3 as specified under the functions of said channels.

Channel 5 - Projector. High level input from the amplifier of a 16mm motion picture projector, external tape recorder, or other high level source. All functions the same as Channel 4. Input jack for this channel shall be located in the rear of the laboratory room in the wall, or in the student booth closest to position of projection equipment when in use.

Channel 6 - Auxiliary console input (Phone jack mounted on surface of control panel) All functions the same as channel 4.

Channel 7 - Auxiliary console input (Phone jack) All functions the same as channel 4.

Channel 8 - Auxiliary console input (Phone jack) All functions the same as channel 4.

Channel 9 - Spare

Channel 10 - Spare

V.6 DISTRIBUTION OF PROGRAMS:

Programs from console channels shall be distributed to the laboratory booths by section. A section is defined as a group of booths in the same row. There should be no less than two nor more than four booths in one section. For this purpose, rotary switches with 11 positions, with positions numbered 1 thru 10 to correspond to the above channels and an OFF position, shall be employed. Accordingly, there shall be _____ rotary switches (one for each section) located on the master panel in a configuration which corresponds to the physical layout of the sections in the laboratory.

V.7 CONSOLE CHANNEL MONITOR:

Channel monitor shall consist of a rotary switch with not less than 11 positions, numbered 1 thru 10 to correspond with the Channels above, and an OFF position. Output from switch shall connect to at least 2 phono jacks, so that any selected channel may be monitored at the panel by at least two persons.

V.8 PROGRAM LEVEL SETTING:

Level setting shall be accomplished by means of a V.U. meter, not less than 3-1/2" in size, mounted conveniently on the master panel. Selection of channel across which meter is placed for reading may be done by incorporating the meter

with the console channel monitor above, but a meter ON-OFF switch should be provided to protect the meter from pegging while a high-volume program is being monitored.

V.9 INSTRUCTOR MONITOR-INTERCOM:

The instructor monitor-intercom shall permit the teacher or technician to listen to the recording and/or spoken responses into the microphone of any individual student. It shall also enable the teacher at the console to carry on a conversation with any individual student, without disturbing anyother student regardless of the position of the student amplifier function control. Instructor shall also be able to monitor the student position in all functions. (This means that in the playback function the instructor is monitoring the student's tape but not his microphone). Monitor-intercom switches shall be placed on the master panel along side the program distribution switches. Switches for accomplishing these functions may be of the toggle or lever type. There shall be ____ switches, one for each student booth. Monitor-intercom shall include a microphone as specified below, and a microphone amplifier with a volume control and ON-OFF switch with pilot lamp. Switching the instructor's microphone on and off shall be accomplished by means of a single switch located conveniently on the control panel, or by means of a press-to-talk microphone. Spring-loaded ALL CALL switch shall be provided. Monitor-Intercom facility shall include two (2) phono jacks. The sustem shall be designed so that switching of program or monitor-intercom switches does not cause any perceptible change in listening level, or any audible clicks, at the headphones in any of the student booths. Room shall be provided on the panel for addition of monitor-intercom switches for ___ student booths in the future.

V.10 SPEAKER SELECTOR:

Speaker selector shall be provided to control the switching of any program from any console channel through the basic power amplifier to the laboratory loudspeaker system(s). The selector facility shall include: 1) An AC ON-OFF switch with pilot lamp to turn the power amplifier on and off, 2) a volume control knob (may be combined with 1) for setting the program level for the speaker system(s),and 3) a rotary channel selector knob numbered to correspond with the console channels, with an additional position labelled MIC., so that the instructor's microphone may be channeled thru the laboratory speakers for P.A. purposes.

V.11 MASTER PANEL LAYOUT & DIMENSIONS:

The contractor shall submit his proposed master panel layout to the owner for approval. Panel dimensions shall not exceed 18" in depth (front to rear), and not more than 24" in width (side to side).

V.12 HEADPHONES AND MICROPHONES:

The contractor shall supply two (2) headsets and two (2) microphones for teachers' use at the console.

THE STUDENT POSITION - SECTIONS VI, VII, and VIII

SECTION VI. STUDENT POSITION FURNITURE

VI.1 The contractor shall supply student booths and arrange them in the room as designated by the owner. Booths shall conform to the following requirements:

VI.2 Booth shall be of all-metal construction.

VI.3 Overall width of one booth must not exceed 32 inches, and inside width not less than 28 inches.

VI.4 Student desk in booth shall be not more than 24 inches deep -- outside front of booth to rear edge of desk, allowing a wing extension back beyond rear edge of desk of at least 8 inches.

VI.5 Overall height of one booth must not exceed 45 inches.

VI.6 Overall depth of one booth must not exceed 33 inches, including acoustically treated wing extension.

VI.7 Booth design and dimensions must be such as to provide the student with an unobstructed view of the entire front of the room, for seeing teacher, chalkboard, or projected visuals.

VI.8 Student desk top in booth shall be seamless bonded plastic (Formica or equal). Student equipment in booth shall be protected by a ventilating cover of perforated metal. Booth equipment shall be accessible from within booth or from front of booth for checking and maintenance by removal of not more than four screws each for deck, amplifier, or front panel.

VI.9 Each booth will contain -- over and above plug-in connections for tape deck and amplifier -- one 115 volt AC plug receptacle, accessible underneath student desk, for utility purposes.

VI.10 Bid will be accompanied by a description and complete specifications for the booth which the bidder proposes to furnish. Contractor will be required to submit a sample booth for approval before producing the order.

SECTION VII: RECORD/PLAYBACK (LISTEN - RESPOND - COMPARE) EQUIPMENT

VII.1 The contractor shall furnish the specified (Refer to equipment list) and install same in the student booths in accordance with the standards and codes heretofore mentioned.

VII.2 TAPE DECKS WITH RECORD/PLAYBACK AMPLIFIERS:

Record/playback amplifiers shall meet the following minimum specifications.

VII.3 Deck shall have half-track heads, dual channel configuration.

VII.4 Tape decks shall have a resettable index counter of at least 3 digits.

VII.5 Tape deck shall operate at a speed of 3.75 ips.

VII.6 Tape lifted from heads when in rewind, fast-forward, and stop positions.

VII.7 Rewind and fast forward functions must transport 1200 ft. of tape in not more than 90 seconds.

VII.8 Signal-to-noise ratio at a maximum record level to unweighted noise of 45 db or better.

Noise is measured when erasing a signal of peak recording level in the absence of a new signal; thus this value will include the bias, erase, and playback amplifier noise.

VII.9 Head and amplifiers shall be capable of record-playback (overall) frequency response at 3.75 ips of:

| | | |
|---|---|---|
| 100 cps | - 18 db | |
| 250 to 6000 cps | ± 2 db | (250 cps = 0 db) |
| 6000 to 8500 cps | ± 5 db | |

and

Playback only frequency response of 100 to 8,000 cps, ± 2 db, not more than 10 db down at 10,000 cps.

VII.10 Total harmonic distortion not to exceed 3% RMS when measured on a 400 cycle tone.

VII.11 Intermodulation distortion shall not exceed 5%, measured at 60 and 6,000 cps (4:1 ratio).

VII.12 Flutter and wow 0.5% or less.

VII.13 Head arrangement: Tape deck shall incorporate dual-channel half-track record-playback and erase heads. The standard half-track record-playback head (the same one used on an ordinary home tape recorder and on the machines on the master console) shall be hereinafter referred to as the "master" track, and the other, opposite track shall be hereinafter referred to as the "student" track. Heads shall be installed and wired to permit the functions described below in the amplifier specifications.

VII.14 Isolation between heads for the master and student track respectively shall be at least 55 db or better. Audible cross talk will not be tolerated.

VII.15 Tape decks shall be newest model Bell, Califone, Viking 87, or equal.

VII.16 TECHNICAL EVALUATION OF EQUIPMENT:

All tests shall be in accordance with the standards and codes already referred to and where the fidelity of recording is concerned, the specifications affecting frequency response, signal-to-noise ratio, amplitude distortion, intermodulation distortion, flutter, and wow, shall be evaluated from what has been recorded on and then played back on the unit under test.

VII.17 RECORD-PLAYBACK EQUIPMENT FUNCTIONS:

The following specifications summarize the dual channel record-playback functions.

Through the use of a single switch the dual channel amplifier shall permit instantaneous control of student record and playback functions as listed below.

a. Record both channels simultaneously.
b. Play back both channels simultaneously.
c. Play back the lesson or master channel while recording the student response channel.

The amplifier shall be designed and have controls to permit the following functions:

a. Listening through headphones to an audio signal from the master console.

b. The signal from the microphone in the booth amplified and mixed with the signal being received from the console, for simultaneous listening through headphones.

c. Recording signal from the master console onto the master track of the student's tape.

d. Recording student's own voice through booth microphone onto student track of tape, while recording signal from console onto master track.

e. Erasure and re-recording of student track without erasing master track, while listening back to master track; erasure of master track only when recording anew signal from the master console.

f. Playing back both master and student track simultaneously for listening in the student booth (for purpose of compari=

son). Student's microphone shall be automatically switched off and dead in this mode.

g. Provision for student to be disconnected from the master program for independent library study.

h. NAB equalization at 7.5 ips; analogous (standard) equalization at 3.75 ips.

i. Recording level for student booth amplifier may be pre-set if microphone and input circuit are designed and combined so as to prevent overloading and consequent distortion of the student or master recordings; otherwise separate gain controls with either bar tube or VU meter indicators must be provided.

j. Listening volume control required. Volume control shall not permit complete attenuation of program.

k. Extra headphone jack on amplifier panel for monitoring by another person beside student occupying booth.

l. Pilot light indicator shall be provided.

VII.18 HEADPHONES:

Headphones shall have a frequency response 100 to 8,000 cps, and shall be dynamic or sealed crystal type (Brush BA220 or equal). Contractor shall furnish ____ sets of headphones, one for each booth and ____ spares.

VII.19 MICROPHONES:

Microphones shall be dynamic type, frequency response 100 to 8,000 cps plus or minus 3 db or better. Combination headset with boom-attached microphone is to be referred. Microphone shall be connected to student amplifier by means of a standard ¼" phone plug color-coded red. Student amplifier will therefore have a surface-mounted phone jack for connection. Contractor shall furnish microphones, one for each booth and ____ spares.

VII.20 TAKEUP REELS:

Takeup reels shall be furnished for each recorder, one installed in each booth (3-spoke Scotch reels or equal.)

SECTION VIII:AUDIO ACTIVE (LISTEN-RESPOND) EQUIPMENT

VIII.1 AMPLIFIER SPECIFICATIONS:

Listen-respond amplifiers shall meet the following minimum specifications.

a. Total harmonic distortion: 1%

b. Intermodulation distortion: 2%, 60 cps and 6,000 cps, four-to-one ratio.

c. Signal-to-noise ratio: 50 db below maximum listening level (50 db below 2V for Brush phones).

d. Frequency response: 60-10,000 cps plus or minus 2 db.

VIII.2 AUDIO-ACTIVE EQUIPMENT FUNCTIONS:

The amplifier shall be designed and have controls to permit the following functions:

a. Listening through headphones to an audio signal from the master console.

b. The signal from the microphone in the booth amplified and mixed with the signal being received from the console, for simultaneous listening through headphones.

c. Listening volume control required. Volume control shall not permit complete attenuation of program.

d. Extra headphone jack on amplifier panel for monitoring by another person beside student occupying booth.

e. Pilot light indicator shall be provided.

VIII.3 _____ sets of headphones, response 100 to 8,000 cps, dynamic or sealed crystal type, one for each booth and _____ spares, (Brush BA220 or equal).

VIII.4 _____ microphones, dynamic type, frequency response 100 to 8,000 cps plus or minus 3 db, or better, output -- 55 db., one for each booth and _____ spares. Combination headset with boom-attached microphone is to be preferred.

SECTION IX: ADDITIONAL EQUIPMENT AND SUPPLIES

In addition to equipment permanently mounted in student booths, console, and racks, the following items shall be supplied:

IX.1 1 - Good quality ($200 to $350 list price range) portable monophonic tape record-playback machine meeting the following specifications:

A. Mechanical:

1) Must accomodate 7" reels.

2) Two speeds, 7.5 and 3.75 ips, with speed switch

3) Wow and Flutter: Must not exceed .5% RMS at 3.75 ips.

4) Must have pause button.

5) Fast Forward and Rewind functions must transport 1200 feet of tape in not more than 90 seconds.

6) Weight must not exceed 25 lbs.

B. Electronic:

1) Total Harmonic Distortion (rec/playback shall not exceed 3% at peak recording level when measured on a 400 cycle tone.

2) Signal-to-noise ratio shall be at least - 50 db at 7.5 ips, and - 45 db at 3.75 ips.

Noise is measured when erasing a signal of peak recording level in the absence of a new signal; thus this measurement will include the bias, erase and playback amplifier noise.

3) Frequency Response:

Playback only -- 50 to 14,000 cps± 2 db at 17-1/2 ips. 70 to 10,000 cps ± 2db at 3-3/4 ips.

Rec/playback -- 70 to 10,000 cps ± 2 db at 7-1/2 ips. 100 to 6,000 cps ± 2 db at 3-3/4 ips.

4) Power Output -- Not less than 3 watts (IHFM standard)

5) Inputs -- 2, microphone and high level.

6) Outputs -- Internal speaker, Extension speaker, and Preamplifier output.

7) Machine must include an accurate record level indicator (VU meter, bar tube, or <u>TWO</u> neon indicators).

8) Machine shall have a pilot lamp or illuminated VU meter to indicate it is ON.

IX.2 1 - Bulk tape eraser. Robins ME-99 or equal.

IX.3 2 - Tape Splicers. Robins TS4A-STD or equal.

IX.4 - Tape head demagnetizer. Robins HD-6 or equal.

IX.5 1 - Robins TK-5 strobe and light kit.

[Specify the following if desired or contract for separately.]

IX.6 ____ - Rolls of splicing tape. 3M #41P or equal.

IX.7 ____ - Reels of leader tape 1/4" x 1000' 3M #43P, or equal.

IX.8 ____ - Empty 5 or 7" reels, plain or colored in plain white hinged boxes.

IX.9 ____ - Blank reels of 1/4" magnetic recording tape, 600 or 1200 ft., meeting the following specifications:

7-inch 1200 ft. reels of magnetic recording tape having 1-1/2 mil polyvinyl chloride backing, ultimate tensile strength 8.2 lbs.

or

7-inch 1200 ft. reels of magnetic recording tape, having one and one-half mil polyester (mylar) backing, ultimate tensile strength 9 lbs. Tape must be first quality tape and must meet the following specifications:

Permanent and effective lubrication
Frequency response -- 40 to 10,000 cps ± 2 db or better
Tape noise -- 52 db below maximum record level, or better
Intrinsic Coercivity -- 230 or better (oersteds)
Retentivity -- 1000 (Gauss)
Remanence (flux lines/1/4" tape) 0.6
Relative bias for maximum LF Output - ma -- 5.0
Low Freq. sensitivity - db -- 0
LF Output (for 1% 3rd order distortion - db -- 0
HF sensitivity (1 mil wavelength) - db: --
Uniformity @ 15 mil wavelength - db:
Within a roll ± 1/4
Roll to Roll ± 1
(Scotch #111-12 used as a standard)
Tape shall be splice free
Tape shall be furnished in hinged boxes

# B I D  F O R M

SECTION X -- BID FORM



Instructions:

a. This form must be completed by the bidder after the school has inserted in the space provided the name of the MANUFACTURER and the items MODEL NUMBER. Failure to comply will give the Owner the right to reject the bid in its entirety.

b. TOTALS. The ITEM TOTAL should be the sum of the PRICE EACH column for each section and should include installation and warranty costs. The sum of the ITEM TOTALS constitutes the total contract amount. The figure in the PRICE EACH space for each item may be used for addition or subtraction of items of equipment by the Owner.

c. MANUFACTURER & MODEL NUMBER. To be completed by the school. Refer to Paragraph 1.9 (QUALITY) of the GENERAL PROVISIONS ( page 2 ).

d. If bidder desires to bid more than one combination of alternate components, use a separate BID FORM for each combination. Fill out each BID FORM completely.

EQUIPMENT FOR SECTION III: PROGRAM PREPARATION ROOM

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 2 | Vertical relay racks, 77" panel height, with 19" W panels as needed | _____ | _____ | III.2 | _____ | _____ |
| 3 | Tape record/playback machines | _____ | _____ | Channels 1-3 III. 3&5 | _____ | _____ |
| 1 | Phonograph turntable, complete with tonearm | _____ | _____ | Channel 4 III. 3&5 | _____ | _____ |
| 1 | Stereo Phonograph cartridge | _____ | _____ | Channel 4 III. 5 | _____ | _____ |
| 1 | Phono control amplifier, monaural | _____ | _____ | Channel 4 III.5 | _____ | _____ |

SECTION III: PROGRAM PREPARATION ROOM (continued)

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 1 | FM Tuner, wideband | | | Channel 6 III. 5 | | |
| 1 | General coverage radio receiver, BC & short wave | | | Channel 5 III. 5 | | |
| 1 | Rack Control panel | | | III. 6 | | |
| 1 | 3-1/2" VU meter for rack control panel | | | III. 8 | | |
| 2 | Sets of headphones | | | IV. 12 | | |
| 1 | Basic monophonic power amplifier | | | III. 9 | | |
| 2 | Rack monitor speaker systems in manufacturer's enclosures | | | III. 9 | | |

SECTION TOTAL FOR SECTION III, PROGRAM PREPARATION ROOM:

SECTION IV: LABORATORY ROOM CONSOLE

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 1 | Laboratory Room Console | | | IV. 1 | | |
| 3 | Tape Playback machines | | | IV. 3 IV. 5 | | |
| 1 | Console Control Panel | | | IV. 2 thru IV. 11 | | |

SECTION IV: LABORATORY ROOM CONSOLE (continued)

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 1 | VU Meter for console control panel | | | IV. 8 | | |
| 2 | Sets of headphones for console use | | | IV. 12 | | |
| 2 | Dynamic microphones | | | IV. 12 | | |
| 1 | Basic power amplifier | | | IV. 10 | | |
| 1 | Loudspeaker system in manufacturer's enclosure | | | IV. 10 | | |

SECTION TOTAL FOR SECTION IV, LAB ROOM CONSOLE _____

SECTION V: LABORATORY MASTER CONSOLE

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 1 | Laboratory Master console | | | V. 1 | | |
| 3 | Tape Record-play-back machines | | | V. 3<br>V. 5 | | |
| 1 | Phono turntable and amplifier | | | V. 3<br>V. 5 | | |
| 1 | Console Control panel | | | V.2 thru V. 12 | | |
| 1 | Power amplifier | | | V. 10 | | |

SECTION V: LABORATORY MASTER CONSOLE (continued)

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 2 | Sets of headphones for console use | | | V. 12 | | |
| 2 | Dynamic microphones | | | V. 12 | | |
| 1 | Loudspeaker system in manufacturer's enclosure | | | V. 10 | | |
| 1 | VU Meter for console control panel | | | V. 8 | | |

SECTION TOTAL FOR SECTION V, LABORATORY MASTER CONSOLE

SECTION VI: STUDENT POSITION FURNITURE

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 30 | Student Booths | | | VI. 1 thru VI. 11 | | |

SECTION TOTAL FOR SECTION VI, STUDENT POSITION FURNITURE

SECTION VII, STUDENT POSITION RECORD-PLAYBACK EQUIPMENT

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 31 | Dual-channel student tape decks & amplifiers, one unit for each booth & 1 spare | | | VII. 2 thru VII. 17 | | |
| 32 | Sets of headphones | | | VII. 18 | | |
| 32 | Microphones, dynamic | | | VII. 19 | | |

SECTION VII, STUDENT POSITION RECORD-PLAYBACK EQUIPMENT (continued)

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| 36 | Take-up Reels, 7", one for each booth and 6 spares | _____ | _____ | VII. 20 | _____ | _____ |

SECTION TOTAL FOR SECTION VII, STUDENT POSITION RECORD-PLAYBACK EQUIPMENT _____

SECTION VIII, STUDENT POSITION AUDIO-ACTIVE EQUIPMENT

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| ___ | Student listen-respond amplifiers | _____ | _____ | VIII. 1 & 2 | _____ | _____ |
| ___ | Sets of headphones | _____ | _____ | VIII. 3 | _____ | _____ |
| ___ | Microphones, dynamic | _____ | _____ | VIII. 4 | _____ | _____ |

SECTION TOTAL FOR SECTION VIII, STUDENT POSITION AUDIO-ACTIVE EQUIPMENT _____

SECTION IX, ADDITIONAL EQUIPMENT AND SUPPLIES

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| ___ | Portable Tape Recorder | _____ | _____ | IX. 1 | _____ | _____ |
| ___ | Bulk Tape Eraser | _____ | _____ | IX. 2 | _____ | _____ |
| ___ | Tape Splicers | _____ | _____ | IX. 3 | _____ | _____ |
| ___ | Tape Head Demagnetizer | _____ | _____ | IX. 4 | _____ | _____ |

SECTION IX, ADDITIONAL EQUIPMENT AND SUPPLIES (continued)

| QTY | EQUIPMENT DESCRIPTION | MANUFACTURER | MODEL NUMBER | REFERENCE | PRICE EACH ITEM | TOTAL |
|---|---|---|---|---|---|---|
| ___ | Tape Strobe & Light Kits | _____ | _____ | IX. 5 | _____ | _____ |
| ___ | Rolls of splicing tape | _____ | _____ | IX. 6 | _____ | _____ |
| ___ | Reels of leader tape | _____ | _____ | IX. 7 | _____ | _____ |
| ___ | Empty 5" or 7" reels, plain/colored | _____ | _____ | IX. 8 | _____ | _____ |
| ___ | Blank reels magnetic recording tape | _____ | _____ | IX.9 | _____ | _____ |

TOTAL FOR SECTION IX, ADDITIONAL EQUIPMENT AND SUPPLIES _____

TOTAL BID FOR ENTIRE CONTRACT _____

## COMMON LANGUAGE LABORATORY TERMS

ACETATE BASE - The transparent plastic film which forms the tough backing for most of the audible range magnetic recording tape made. It is very popular because it meets all normal recording requirements and costs less per foot than polyester backing.

A.C. SWITCH - A switch to turn on and off the alternating current which provides electrical power.

ALL CALL SWITCH - A switch mounted on the console to enable the teacher to communicate simultaneously with all student positions.

AMPLIFIER - A Component designed to boost a signal sufficiently to operate a loudspeaker or headphones.

AUDIBLE TONES - Sounds with wave frequencies which the average human can hear and which range from 30 to 15,000 cycles per second.

AUDIO-ACTIVE - Wiring which carries the sound signal from its source (console, projector, etc.) to a desired point (student booth, loudspeaker, etc.)

AUDIO-LINGUAL - A term commonly used to describe a type of language instruction which stresses listening and speaking skills.

AUDIO-PASSIVE - A term used to refer to listening practice when no oral response is expected. Used to apply to facilities in which students are equipped with headphones only.

AUDIOWIRING - Cables through which the sound is transmitted as compared to power wiring which carries the electrical current. Unless shielded cables are used, hum and cross-talk interference may occur.

AUTOMATIC SHUT-OFF - Special switch incorporated in some tape recorders which automatically stops the machine when the tape runs out or breaks.

BOOTHS - A small work area for students providing semi-isolation by virtue of dividers which separate each student from his neighbor. Usually some of the booth area is acoustically treated to reduce interference with other student positions.

BRAKING MECHANISM - Apparatus on a tape recorder which stops the motion of the reels. If not properly adjusted, tape spillage, stretch, or breakage may occur.

BULK ERASER - A 110 volt A.C. device used to erase an entire reel of magnetic tape at once without running it through a recorder. It uses a strong magnetic field which neutralizes the magnetic patterns on the tape.

CAPSTAN - Rotating spindle or shaft which draws the tape across the heads at a constant rate of speed on both recording and playback. Operates in conjunction with a rubber pressure roller.

CHANNEL - Audio information or signal which is carried or transmitted over a specific path or track.

CHANNEL, MULTI - When applied to program source, this means that several sources can be transmitted simultaneously to selected student positions in the language laboratory network. When referring to a recorder, it means that several different signals or channels are recorded or played back simultaneously but separately through a multi-track recorder.

CONDUIT - A kind of rigid or flexible metal pipe or tubing which contains the wires that conduct the signals or current.

CONSOLE - A central control unit for a language laboratory installation. It provides a program cource. In addition, it may provide for monitoring of student positions, intercommunication between teacher and pupil or pupil and pupil, and recording of pupils.

CYCLES PER SECOND - The unit for measuring the frequency, or "pitch," of any sound. Abbreviated "cps."

DECIBEL - Abbreviated "db", it is relative measure of sound intensity or "volume." It expresses the ratio of one sound intensity to another. One db is the smallest change in sound volume that the human ear can detect.

DISTORTION - Any difference between the original sound and that reproduced by a recording machine. Distortion takes on many forms, and although it can never be completely eliminated, it can be reduced to a minimum in a good recording and reproducing system. Tape offers the maximum potential in distortion-free recording.

DUAL CHANNEL RECORDING SYSTEM - A system which provides for the simultaneous recording of two sources on separate channels. In this system, the student may record at his position both the program coming from the console and his own voice.

EAR CUSHIONS - Rings of soft rubber or plastic foam set around the earphones to minimize the interference of outside sounds for the listener.

ELECTROMECHANICAL - Refers to devices whose functions are

accomplished by interrelated mechanical and electrical (or electronic) processes. Sometimes used to denote any of the audio or audio-visual components of language laboratory facilities, such as tape recorders, headphones and so on.

ERASURE - Neutralizing the magnetic pattern on tape by placing it in a strong magnetic field, thereby removing the recorded sound from the tape. An "erase" head on a tape recorder does this automatically to any sound previously recorded on the tape just before the tape reaches the "record" head. A permanent magnet can also be used to erase magnetic tape, but with a resultant increase in background noise.

EQUALIZATION - Either boosting or decreasing the intensity of the low, middle, or high tones of a recording during a recording or playback or both. This compensation serves to correct any deficiencies in the recording system and to increase the signal-to-noise ratio.

FAST FORWARD - Tape movement control which permits fast winding of the tape to facilitate location of a specific portion which has not yet been played. The speed of this movement may vary considerably from one model recorder to another.

FEED REEL - Reel on a tape recorder which supplies the magnetic tape.

FIDELITY - A measure of the exactness with which any sound is duplicated or reproduced.

FLAT RESPONSE - Ability of an audio system to reproduce all tones (low or high) in their proper proportion. A sound system might be specified as having an essentially flat response, plus or minus two db. from 75 to 9,000 cycles per second.

FLUTTER - Very short rapid variations in tape speed causing similar variations in sound volume and pitch, not present in the original sound. A form of distortion.

FOOT SWITCH - Electrical or mechanical foot pedal device for stopping and starting a tape recorder without use of hands, especially useful for dictating and transcribing.

FREQUENCY RESPONSE - This is the output level of a recorder or sound system over a specific range of frequencies which is usually charted in the form of a curve. It is more specific than "frequency range" and includes the plus or minus decibel rating which shows the "flatness" of the response or deviations above or below an average level.

GAIN - The ratio between the input level and output level of a piece of sound equipment. Gain is increased by means of an amplifier.

GROUP STUDY LABORATORY - A language laboratory designed so that groups of students, often an entire class, are working simultaneously on a given lesson.

HEAD - The ring-shaped electromagnet across which the tape is drawn, and which magnetizes the tape's iron coating in a series of patterns. Most tape recorders employ a combination record-playback head and also an erase head. Some professional machines also employ a monitor head for listening to the recorded sound a split second after it has been put on tape.

IMPEDANCE - A rating in ohms of the input and output of any electrical component, generally referred to either as "high" or "low" impedance. Importance is that, in connecting any two components, the output and input impedances must match. Most home tape recorders use a high impedance microphone and require a relatively short, shielded connecting cable. Low impedance microphones used on professional recorders can use much longer cables with no loss in high frequencies.

INDEX COUNTER - An odometer type counter which makes it possible to note the location of any particular selection of a tape, thereby making it easier to find. Most late model recorders feature built-in index counters.

INDIVIDUAL STUDY LABORATORY - Often called a library type laboratory. This facility enables each student to work individually with his own lesson at his own speed.

IN LINE HEADS - Arrangement of stereophonic heads on a tape recorder so that gaps are directly in line. One head is mounted directly above the other. Also called "stacked" heads.

INPUT - An electrical voltage fed into an amplifier.

INVERTER - Device to change one type of electrical current to another type. Frequently used to change 6 volt or 12 volt direct current to 110 volt alternating current for operation of a tape recorder in an automobile.

I.P.S. - Abbreviation for tape speed in inches-per-second.

JACK - Receptacle for a plug connector leading to the input or output circuit of a tape recorder or other piece of equipment.

LEADER AND TIMING TAPE - Special tough non-magnetic tape which can be spliced to either end of a tpae to prevent damage or breaking off of the magnetic tape ends and possible loss of part of the recorded material. Used as a timing tape, therefore, it can be spliced between musical selections on a tape providing a pause of a given number of seconds, depending on the tape speed.

LEVEL INDICATOR - A device on the tape recorder to indicate the level at which the recording is being made and which serves as a warning against under-recording or over-recording. It may be a neon bulb, a "magic-eye", or a VU meter.

LOW PRINT TAPE - Special magnetic recording tape which reduces print-through (transfer of signal from one layer to another) which could result when tape is stored for long periods of time. These tapes are especially useful for "master recording" (making an original recording from which copies will be made).

MAGNETIC TAPE - A high-quality plastic tape which has been precision-coated by the manufacturer with a layer of magnetizable iron oxide particles. The result is a recording media that is subject to virtually no wear, can be erased and reused, and offers the highest fidelity of reproduction possible today.

MASTER - Term used to designate a device which has control over several others or produces the original taped material. Often applied to tape, program, console, switch, duplicator, etc. The term "slave" is used sometimes to designate another device controlled by a "master."

MIL - One thousandth of an inch. Tape thickness is usually measured in mils.

MIXER - Device by which signals from two or more cources can be fed simultaneously into a tape recorder at the proper level and balance.

MONAURAL RECORDER - Standard type tape recorder which uses a single-channel system consisting of one microphone, amplifier and recording head (as opposed to a binaural or stereophonic recorder).

MONITORING - In the language laboratory the term generally implies listening to students electronically from the console.

OUTPUT - An electrical voltage coming from an amplifier and normally fed into a loudspeaker.

OXIDE - Microscopically small particles of ferric oxide dispersed in a liquid binder and coated on a tape backing. These oxides are magnetically "hard" -- that is, once magnetized, they remain magnetized permanently unless they are demagnetized by exposure to a strong magnetic field.

PATCH CORD -- Sometimes called "attachment cord." A short cord, or cable, with a plug on either end (or with a pair of clips on one end) for conveniently connecting two pieces of sound equipment such as a phonograph and tape recorder, an amplifier and speaker, etc. Not used for 110 volt current.

PAUSE LEVER - Any control which permits the instant but temporary halting of playback or recording functions.

PLAYBACK HEAD - Magnetic head used to pick up signal off a tape. Often same head as used for recording, but with circuitry changed by means of switch.

PLUG - Circuit connector which is inserted into a jack.

POLYESTER BACKING - Plastic film backing for magnetic tape used for special purposes where strength and resistance to temperature and humidity change are important.

PORTABLE TAPE RECORDER - Usually any tape recorder designed to be easily moved or carried about, but in most cases requiring an A.C. power supply. Some portable recorders, however, are self-powered and use batteries or a spring motor: hence are completely portable.

POWER AMPLIFIER - An amplifier designed to operate a loudspeaker.

POWER CORD - Cord for connecting the tape recorder to 110 volt A.C. current.

PRE-AMPLIFIER - An amplifier that raises extremely weak signal levels such as those from a microphone, magnetic playback head or a phonograph pickup to a level useable by the power amplifier. Some tape recorders combine the pre-amp and the power amplifier. Others -- especially the tape recorders designed for use in high fidelity music systems -- may feature a separate pre-amplifier. In such cases, the pre-amp includes an equalization circuit. In addition, the bias oscillator (necessary to record on tape) is often mounted in a unit with a pre-amp.

PRE-RECORDED TAPE - A recording on tape that is commercially available.

PRINT THROUGH - Transfer of the magnetic field from layer to layer of tape on the reel.

PROGRAM - Lesson unit or other recorded practice material which is played from the console or a simple recorder and received by the students at their stations.

QUICK-STOP CONTROL - Feature of some tape recorders making it possible to stop the movement of the tape temporarily without switching the machine off "play" or "record" position. Essential for a tape recorder used for dictation.

RAW TAPE - A term sometimes used to describe tape that has not been recorded. Also called "virgin" tape or "blank" tape.

RECORDING NOISE - Noise induced by the amplifier and other components of the recorder. High quality magnetic tape itself is inherently noise-free.

REEL, SUPPLY - in a reel-to-reel (two reel) tape deck this is the reel which supplies the tape as it is being recorded or played back. Also called feed reel.

REEL, TAKE-UP - Reel on a tape deck which receives the tape after it passes through the head assembly in recording or play-back.

RELUCTANCE MICROPHONE - Inexpensive electro-magnetic type microphone supplied with many tape recorders which is extremely rugged and durable but generally not as high quality as crystal or ceramic types. Employes a metal "wand" which moves in a magnetic field to produce varying voltages.

REWIND CONTROL - Button or lever for rapidly rewinding tape from the take-up reel to the feed reel.

SELF-POWERED RECORDER - Tape recorder containing its own power supply, either a combination of wet and dry cells to power the unit, or dry cells in conjunction with a spring-driven motor.

SIGNAL-TO-NOISE RATIO - The ratio between the loudest, undistorted tone recorded and reproduced by a recorder and the noise induced by the recording system itself. Normally measured in db's.

SPLICING BLOCK - Metal or plastic device incorporating a groove in which ends of tape to be spliced are inserted. An additional diagonal groove provides a path for a razor blade to follow in cutting the tape. Makes splices very accurately using narrow-width 7/32" splicing tape.

SPLICING TAPE - A special, pressure-sensitive, non-magnetic tape used for splicing magnetic tape. Its "hard" adhesive will not ooze and consequently will not gum up the recording head, or cause adjacent layers of tape on the reel to stick together.

STACKED HEADS - Arrangement of recording heads used for stereophonic sound where the two heads are located directly in line, one above the other.

STAGGERED HEADS - Arrangement of recording heads used for stereophonic sound where the heads are located 1-7/32" apart. Stereo tapes recorded using staggered heads cannot be played on recorders using stacked heads, or vice versa.

TAPE CARTRIDGE - Magazine or hard plastic case containing a reel (or two) of tape which is placed on a recorder without threading. Reel-to-reel cartridges allow the tape movement to be controlled in either direction. Endless-loop or continuous-loop cartridges can continue playing indefinitely but do not permit rewinding at will.

TAPE PLAYER - Unit for playback only of pre-recorded tapes. Sometimes called a tape phonograph.

TAPE SPEED - Tape moves past the recording head at a predetermined speed measured in inches per second (ips). The faster the speed, the better the audio quality or frequency response. Standard speeds are 1-7/8 ips, 3-3/4 ips, 7-1/2 ips, 15 ips, and 30 ips. Most standard recorders use 7-1/2 ips and 3-3/4 ips. The Purchase Guide recommends 7-1/2 ips for language laboratory use.

TAPE SPLICER - Device for splicing magnetic tape automatically or semi-automatically similar to a film splicer. Different models vary in operation, most using splicing tape, some employing heat.

TAPE THREADER - Device on the hub of a reel for securing the end of the tape to the reel.

TAPE TRANSPORT - Mechanism which moves the tape past the heads. It includes head assembly, motor, and controls for tape movement. It does not normally refer to the electronic components which together with the transport mechanism constitute a tape recorder. Also called a tape deck or tape drive.

THREADING SLOT - Slot in recording head assembly cover-plate into which tape is slipped in threading up the reels for use of the recorder.

TRACK - Magnetized area on a tape laid down by the head in recording.

VOLUME - An acoustical -- rather than electrical -- measurement, which refers to the pressure of the sound waves in terms of dynes per square centimeter. The louder the sound, the greater the pressure. Most technicians prefer to talk in terms of decibels.

WOW - Slow variations in tape speed causing similar variations in sound volume and pitch not present in the original sound. A form of distortion.

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